AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.

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The AMSAT-Stoner Challange Cup

An International Amateur Radio Satellite Competition

Bill Orr, W6SAI, is one of Amateur Radio's best known and respected authors. In a now-classic *QST* article ("Sixty Years of Radio Amateur Communication", *QST*, Feb. 1962) Bill recounted a bit of history. It was one of those pivotal moments in the fascinating genesis of amateur satellites. Bill's telling goes thus:

> "The radio amateur gazed thoughtfully for a moment at the white paper in his typewriter. Suddenly his fingers sprang into action and the keys flashed the fateful words, 'Currently being tested is a solar powered six-to-two-meter transistor repeater which could be ballooned over the Southwest. Can anyone come up with a spare rocket for orbiting purposes."

The fingers were those of Don Stoner, W6TNS, writing his "Semiconductors" column for *CQ*. The "fateful words", as W6SAI later put it, appeared in the April 1959 edition of *CQ*. From that point hence there existed a remarkable series of events resulting in OSCAR 1 (December 1961) through the recent launch of AMSAT-OSCAR 10, the most advanced of the proud lineage. But arguably it all began with those "fateful words" two and half decades ago.

Now AMSAT is set to commemorate the 25th anniversary of Don Stoner's challenge to "come up with a spare rocket" with a challenge of its own. The AMSAT-Stoner Challence Cup for amateur satellite enthusiasts will begin in April and aims to simultaneoustly recall the lineage while fixing sights firmly on the future of amateur radio in space with OSCAR. The AMSAT-Stoner Challenge Cup will take the form of an operating competition on AMSAT-OSCAR 10. The competition will run for three months and offers the winners in three categories substantial hardware (trophies, plaques) and software (certificates).

The competition is open to licensed amateurs and amateur radio satellite enthusiasts worldwide. The purpose of the competition will be to promote satellite activity through familiarity with its capabilities, to AMSAT membership and to stimulate refinement of ground station performance with especial emphasis on receive capabilities.

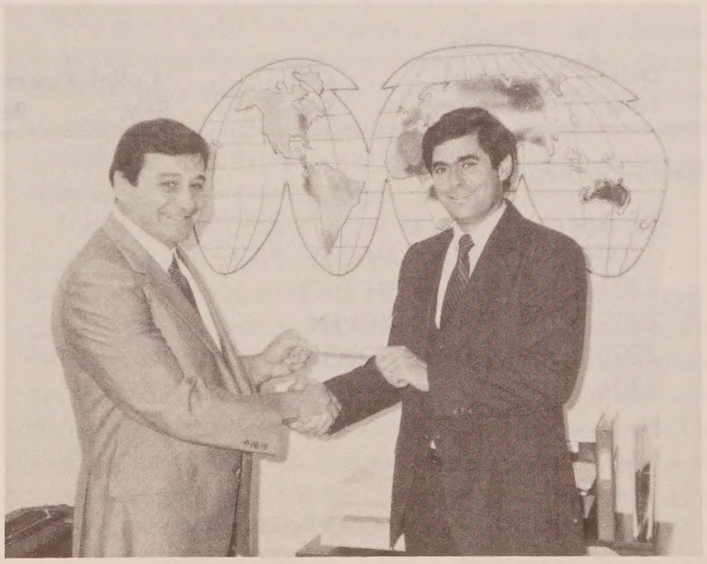
The competition shall be held in three sections:

1. AMSAT members
2. Non-AMSAT members
3. SWLs (both members and non-members).

The general idea is to work as many stations in as many different grid squares as possible. Special emphasis (through scoring method) is placed on low-power transmitting and superior receive capability through bonus points. Grid squares are a universal system of dividing the earth's surface into uniquely identifiable zones 2 degrees by 1 degree (longitude by latitude, respectively). The grid square system is described in *QST*, January, 1983, page 49. The article describes how to ascertain your own grid square identification. For example, ARRL Headquarters is at grid FN31. A more complete explanation, including the plan for locations outside the USA appears in "The Lunar Letter", April 1982, in an article entitled, "Worldwide QTH Locator System Proposed By Region 1," by Lance Collister, WA1JXN.

AMSAT will supply copies of the articles describing the system together with sample logs for this competition for $2 plus a SASE or (overseas) for $2 plus an SAE with 5 IRCs.

Complete rules are specified below. Because of the sensitivity of AMSAT OSCAR-10 to possible "desense" due to



Henry Norman, VITA Executive Director (left), presents a $5000 check to AMSAT's General Manager Bill Lazzaro, N2CF. The donation made last autum will fund initial PACSAT work.

excessivily high power on the uplink, the rules will be strictly enforced. Disqualification of stations using excessive power may result. This being the first-ever competition of its type, AMSAT has resolved to approach the activity with cautious optimism. A disciplined, mature approach to the competition is thus required of all participants. Unlike hf competitions where the sponsors can hardly turn off the ionosphere, THIS "ionosphere" can be turned off should things get out of hand.

The AMSAT-Stoner Challenge Cup is a benchmark for future, longer-termed AO-10 operating events and even AMSAT's Technical Achievement Award for superior ground station capability (especially receiver performance).

So step up to the ultimate in space-age amateur radio events: The AMSAT-Stoner Challenge Cup and we'll BCNU on AO-10! GL! — *Doug Loughmiller, KO5I, AMSAT Vice President, Operations*

AMSAT-Stoner Challenge Cup Official Rules

1) Objective: Two-way communication via AO-10 Mode B or Mode L using the lowest uplink power possible. For SWLs, the objective is to report as many QSOs as possible with special emphasis on those QSOs involving QRP stations.

2) Competition Period: Commencing 0000 UTC 15 Apr. 84 and running continuously through 2400 UTC 14 July 84. No time limit on cumulative operating time.

3)Entry Categories:

a) Challenger Class (AMSAT Members only; affiliated AMSAT organizations are included, e.g., AMSAT-UK, AMSAT-DL, JAMSAT, etc.)

b) Competitor Class (Future AMSAT Members; not currently members)

c) Observer Class (SWLs; includes hams not presently equipped for AO-10 both members and future members)

4) Exchange: QSO serial number, uplink power code, grid square and AMSAT member number (if any). See below for power code.

5) Scoring:

Scoring is based on three major elements:

a) QSO points which are earned for each QSO completed. Credit is given in inverse proportion to the uplink power employed. Basically the lower the power, the more points you get for each QSO. Points per QSO will vary both with your uplink and the other stations uplink and are computed on a QSO-by-QSO basis. See below.

b) AMSAT Member multiplier. Each AMSAT member worked doubles the point value of each QSO. Thus an AMSAT member QSO gives you a member multiplier of two. Non-member QSO multiplier is one.

c) Grid square multiplier. The multiplier is equal to one unit for each DISTINCT grid square worked.

For observer class, simply report the power codes of each side of the QSO but do not apply the member multiplier or the grid square multiplier. Observer's score is then the sum of individual QSO power codes as described below.

Scoring details:

QSO Points. Based on the matrix and explanation below.

Uplink power code A is 200 watts EIRP or less.

Uplink power code B is 201 to 800 watts EIRP.

Uplink power greater than 800 watts on Mode B is not permitted.

Uplink power is not limited on Mode L and each QSO is scored as if it were Mode B, code A.

		Your Uplink A	B
Other Station Uplink	A	5	3
	B	3	1

From the matrix one can deduce the following. For QSO points, each QSO in which BOTH stations use less than 200 watts EIRP (code AA), the QSO points total 5. If either station uses less than 200 watts (code AB and BA) the QSO is worth 3 points. If both stations use between 200 and 800, (code BB) the QSO earns 1 point.

SAMPLE LOG AND SCORING INFORMATION FOR THE AMSAT-STONER CHALLENGE CUP

Date/ Time	QSO Serial Number	Call Sign	Uplink Power Code Sent	Received	Grid Square	Member Number	QSO Points
(Sample entries)							
17 Apr.							
2200	523	W6SP	A	A	CM96	132	10
2201	524	VE2VQ	B	A	FA32	543	6
2202	525	XE1TH	B	B	CH86	—	1
2203	526	G3IOR	A	A	EU90	12	10
2204	527	PY2LK	A	A	KY76	—	5
etc.							

Total grid: 200 Total QSO Points: 1250

Grand total: 1250 × 200 = 250,000 points.

Note: Be sure to count only total *different* grid squares worked.

Sample Scoring calculation:

You work an AMSAT member. He's running 500 watts EIRP; you're running 125 watts. The QSO points are 3 (code BA). Since he's a member, the member multiplier is 2. The total worth of the QSO is thus 3 x 2 = 6 points.

You work another station. He's not a member. Both of you are running 100 watts EIRP. The QSO points are 5 (code AA). The member multiplier is 1. (He's not a member). The QSO total is thus 5 x 1 = 5 points.

After all individual QSOs are tallied, the subtotal is multiplied by the grid square multiplier. Suppose your QSO sub-total is 1250 points. Suppose you worked 200 grid squares. Take the QSO points sub-total (1250) and multiply it by the number of different grid squares you worked. Thus: 1250 x 200 = 250,000 points; your grand total.

6) Logs: Log sheets may be obtained from AMSAT as described elsewhere. Home made logs are okay too as long as the format is followed.

7) Miscellaneous: No repeat contacts. One credit only for each station callsign worked. The QTH of your station is optional and can be moved at any time to any other QTH with unlimited freedom. Cw and ssb are the only modes permitted in this initial event. Note the affiliation of the member next to the member number using a convenient abbreviation with notes to indicate what it means, e.g., UK, DL, VE, ZL, etc.

8) Reporting: Logs must be sent to AMSAT, P.O. Box 27, Washington DC 20044 and must be postmarked not later than 1 Sept. 84. A summary sheet must be included to indicate grid square total and QSO point sub-total. A signed statement attesting to the accuracy of the log must be enclosed and the entrant must state the maximum power used did not exceed 800 watts EIRP on Mode B. (No limit on Mode L).

9)Awards:

a) Challenger Class. First place will be honored with a silver loving cup engraved with "AMSAT-Stoner Challenge Cup, 1984. FIRST PLACE (your callsign)". The next 4 finishers will receive plaques. The next 5 finishers will receive special certificates. All entrants in the Challenger Class will receive a certificate.

b) Competitor Class. First place will receive an engraved plaque with the winners callsign and a one year AMSAT Membership. The next four finishers will receive special certificates.

c) Observer Class. The top 5 Observers will receive certificates.

10) Costs: A nominal entry fee is required to offset the costs of administration. AMSAT members fee is $2; non-members is $3.

11) Disqualification: An entrant may be disqualified for:

a) More than 2% log dupes (Callsigns or grid squares claimed)

b) Consistently exceeding the Mode B General Beacon (145.810 MHz) by 6 dB or more; about one S-unit.

c) Behavior incongruous with good amateur radio practice.

US Amateurs Win Radio Sport Medals

ARRL received from the Soviet Radio Sport Federation, medals and certificates for five US amateurs. The Radio Sport Federation sponsored a series of activity weekends throughout the month of October 1982. This operating event was to commemorate the October 3, 1957 launch of Sputnik and the October 28, 1978 launch of RADIO-1 and RADIO-2.

1st Catagory winners were:

W1NU 1st place Gold medal with certificate #261 and score 243.
N4AR 2nd place Silver medal with certificate #266 and score 202.
K9GQ 3rd place Bronze medal with certificate #269 and score 181.

2nd Catagory:

N2AA 1st place Gold medal with certificate #271 and score 114.
WB5EUC 3rd place Bronze with certificate #274 and score 34.

News From Surrey

A Special Report by the Staff at the University of Surrey.

UoSAT Bulletin-61 14:00 27th January 1984

Apologies are due for the late writing and loading of last week's bulletin. The erratic schedule has been due to a combination of factors including lack of sleep, overwork and severe disruptions of service on our mainframe computer system. As can be imagined, the UoSAT-1 operational schedule will be liable to disruption as other tasks become more urgent.

Action will be taken to maintain a UoSAT-1 service during the UoSAT-B launch campaign, however since all members of the operational team will be in the U.S., this will be of a reduced nature. UoSAT-B details will be transmitted continuously once we return during the last week of February.

Detailed specifications of the UoSAT-B spacecraft will not be posted until they have been finalized in flight versions; data on the primary systems will appear first sometime in January, followed by the experimental systems as our workload permits. We hope to start the initial system specifications from next weekend.

The following received from G3YJO:

The flight UoSAT-B spacecraft underwent spin balance tests at British Aerospace last weekend (20th) and was successfully balanced to within 2 gm. meters both static and dynamic. This yields a center of gravity offset from the z-axis of around 0.002 inches compared to the maximum permissable for vehicle separation of 0.015 inches.

The spacecraft has been at Marconi Space & Defense Systems in vibration tests since Wednesday 25th and low-level resonance searches in all three axes have been completed - the first lateral resonance of the s/c is at 42 Hz. The full flight simulation vibration at 20 g's has been successfully completed in the z (thrust) axis after an initial problem with the tip-mass retention mechanism had been resolved. The major area of concern had been associated with the s/c wings - they see 60 g's at the tips, however both the Navigation Magnetometer and Space Dust experiments appear to have survived well. The lateral axes tests will continue over Friday & Saturday with Thermal Vacuum tests scheduled next week.

Harold Price, NK6K, arrived at Surrey on Thursday, 12/1/84 with the flight DCE (Digital Communications Experiment) which he collected in Ottawa, where it was integrated. Final minor hardware modifications were completed over the following weekend, and the module has been soak-tested since whenever not in use on the spacecraft framework. Much credit must be given to the US/Canadian team which has constructed this 3-PCB computer system to fit in a module box only 31mm high! This involved such techniques as sinking the CPU crystal into a cut-out in its circuit board. A full list of constructors will be posted when it is complete.

10 flight cells selected in Ottawa from an initial set of 50 have been potted into cylindrical holes in an aluminium block, and mounted in the central core of the spacecraft. A circuit board containing voltage sensors for each of the 10 cells will be mounted on top of this battery unit. The flight spares will be cycled after launch to simulate the cells on the spacecraft and to allow experimental measurements to be made. When the battery selection is complete, a report of their findings on Nickel-Cadmium battery selection and testing will be produced; this is likely to be of interest to a wide range of Ni-Cd users.

The Canadian group would like us to stress that they are also closely affiliated to the VITA (Volunteers in Technical Assistance) organization, and that the work which they are doing for UoSAT-B and PACSAT is of great importance to that organization as well as the radio amateur service.

The UoSAT-B harness has been constructed on a 3-dimensional model as flight boards were produced and final wiring details confirmed, and inter-module connections are complete. Connections to the experimental modules on the wings, the top and the central core are complete except for a few which will be installed this weekend.

The 1802 computer is complete. Major problems compressing the inter-board wiring into the module boxes necessitate close inspection and possible re-wiring of some sections. The 4116 memory board flight model took some 36 hours to get working, due to the use of RCA and R.S. Components 4028 decoders in the prototypes (UoSAT-1 as well as UoB) and a National Semiconductor version in the flight board. The N.S. version decodes invalid BCD digits differently from the RCA version, and bootstrapping a computer without memory is very awkward!

The CCD camera analogue and digital PCB's have been tested separately and the two sections have now been connected together with a suitable display device, specially constructed by G4GPQ. This allows images to be offloaded at a 4 MHz rate from the CCD directly to a video display thereby allowing interactive assessment of the image quality. Preliminary experiments with the flight CCD and lens configuration, but not yet in a light-tight enclosure, have been most successful. Images of the onlooking experimenters have been displayed, as well as various test cards.

The command system prototype testing is complete, comprising the demodulators, command decoder and output latches. Some 112 commands are available to control the rest of the spacecraft. The flight spare telecommand system has been constructed for interface testing of the other modules, and the flight boards are also complete.

Construction of all 4 telemetry system boards is complete. They are now fully functional, and under soak test. The initial two boards contain a basic telemetry system, with the third adding frame headers and the fourth a programmable channel dwell facility. The dwell facility allows total reorganization of any part of the telemetry frame, for use either in specialized situations for rapidly scanning a number of channels or just to confuse the listening audience! A fault on the dwell command UART, persisting when the device was replaced and also demonstrated on the CCD/radiation memory system, nearly resulted in the scrapping of a whole batch of flight 6402s, since the prototype parts being sufficiently tolerant to hide the problem!

Spacecraft operations schedule

The following spacecraft operations schedule is now in use:

Saturday: 1200 bulletin, telemetry, digitalker, (21 MHz)
Sunday: 1200 bulletin, telemetry, digitalker, (21 MHz)
Monday: Whole orbit fast-scan radiation data
Tuesday: Check-summed telemetry data
Wednesday: Digitalker and 1200bd telemetry.
Thursday: Whole orbit telemetry data scan
Friday: Load bulletin, digitalker & telemetry schedule

The current spacecraft power budget requires the radiation counters and scientific magnetometer loads to be shed in order to run the 2.4 GHz beacon, currently scheduled every other weekend.

Data transmitted last week

The whole-order radiation data recorded on Monday, 23/01/84 started recording at 16:11:07.

Due to problems generating non-blank CCD images and the lack of time for diagnosis, an 1802 program which cycles between Digitalker and 1200bd telemetry will be run each Wednesday. This is also in response to a number of requests from educators for Digitalker transmissions during school times on weekdays.

The whole-orbit recorded telemetry normally transmitted on 26/1/84 was aborted due to the lack of a computer system. Sorry! The new telemetry channels which will be continued next week are: 02, 09, 22, 29, 30, 32, and 39. This is in response to observers requesting continuation of the battery voltages and charge currents and the addition of three of the solar array facet temperatures.

Thanks for reports: JA2GSD, G1CHB, I2KBD, ON7VQ, KDX1A, K1KSY & KA1FAD, VK2AVH, G3HMO, ZL1AOX, Milham Ford School, W2RS, F6BVP.

QSL Cards are on their way.

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